

Acid Washing

UW Madison Center for Limnology

Revised by: Elizabeth Runde (March 2021), Gavin Selking (April 2022), Helen Schlimm (October 2022)

Purpose: This procedure describes the steps to wash glassware using the acid bath and cleaning process in Hasler 119. Users must have completed chemical safety training.

Materials Needed:

- 10% HCl solution acid bath
- DI water
- Scrub brushes
- MQ water
- Small bin of LiquiNox soap solution
- Small bin of RBS detergent solution
- Drying racks/carts
- Aluminum foil
- Lab coat
- Splash apron
- Safety glasses
- Nitrile gloves (3-4 mil thick)
- Chemical-resistant neoprene gloves

Personal Protective Equipment Required:

Nitrile gloves, chemical-resistant neoprene gloves, safety glasses, a laboratory coat, and splash apron are required at all times during this procedure. Nitrile gloves are to be worn underneath the neoprene gloves. PPE prevents contamination of glassware and protects skin and clothing from acid splashing. Additionally, users of the acid washing procedure must ALWAYS wear closed toe shoes, long pants, and have long hair tied back.

Acid Safety Tips:

Be careful! The acid solution is 1 N HCl (~10% concentrated hydrochloric acid). This solution will burn your skin and clothes. If acid is splashed on lab coat, remove immediately so it does not soak through to skin. If acid is splashed on skin or clothes, rinse with tap water immediately. There is a neutralizing sodium bicarbonate solution (blue labeled rinse bottle) stored next to the sink and powdered sodium bicarbonate stored by the back wall to neutralize large splashes or spills. If acid is splashed in eyes, rinse at the eye wash station for at least 15 minutes of consistent flushing.

Procedure:

Pre acid washing:

1. Remove labels from bottles, lids, and glassware. Labels will contaminate the acid bath so this is very important! Soak in hot, soapy water if paper labels are hard to remove physically. Carefully use a small bit of ethanol or acetone on a wypall or kimwipe to remove permanent marker labels.
2. Rinse all glassware at least three times with DI or higher purity water.
3. Scrub any visible particles out of the glassware with the appropriately sized scrub brush. Rinse again three times with DI or higher purity water.
4. Glassware with stubborn particles should be soaked in the LiquiNox bin for at least twelve hours and then rinsed before entering the acid bath.
5. Wait for rinsed glassware to dry or mostly dry before entering the acid bath, to reduced dilution of the acid solution.

During acid washing:

6. Glassware that has been pre-cleaned and rinsed can now be placed into the acid bath. Carefully place materials into the bath to prevent splashing. Submerge everything completely. Glassware should soak in the acid bath for at least twelve hours.

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7. Small items (e.g. caps, septa, glass stoppers) can be soaked in an acid bath created from a 1 L Nalgene bottle with a cap. These items should be soaked for at least twelve hours, followed by a batch rinsing in MQ water and soaking in MQ water for at least twelve hours.
8. After acid soaking, carefully remove glassware from the acid bath and rinse at least three times with MQ water from the carboy to the right of the sink. Refill the MQ when it gets low following the instructions posted. Do not overflow. *Glassware used for chloride analysis should be filled with MQ for additional soaking after this rinsing step.
9. Set glassware upside down on the wypall lined racks of the drying carts located against the back wall. Ensure that any remaining MQ can drain and that glassware is not touching. If there is a large quantity of something small like caps or stoppers, spread them out to dry effectively.

Post acid washing:

10. Make sure glassware is fully dry before putting away, which can take at least twelve hours depending on the size and material.
11. Put on a clean pair of nitrile gloves before handling dry glassware. Cap with aluminum foil so no dust can get inside and return to appropriate lab shelving.

Additional Tips:

- These materials should never sit in an acid bath. Quick rinsing with acid is acceptable for cleaning.
 - Metal
 - Rubber
 - Plastic caps with gaskets
 - Nylon
 - Polystyrene
 - PVC
 - Clear ABS plastic
- Generally, all glassware and HDPE or LDPE plasticware can be soaked in the acid bath.
- Glassware that contained highly concentrated nutrient solutions* or metals should be soaked in a separate small bin as to avoid contamination of the communal bath. *This glassware should be fully rinsed and then washed in a LiquiNox/RBS solution in WSEL B102B, following instructions in the SOP "Dishwashing."
- The acid bath should be changed at least quarterly, based on the intensity of use and cleanliness of the dishes.

Acid Bath Preparation (Instructions written in 2012, Revised in 2021 and 2022):

Follow these instructions to change the acid bath. **This procedure should only be carried out by trained lab personnel!**

1. Before changing the acid bath, make sure there is sufficient HCl in the corrosives cabinet to prepare the acid bath. Use Fisher brand (not Optima). Put on appropriate personal protective equipment. If at any time you start to feel light-headed, step into the hallway/outside and catch your breath.
2. Neutralize the acid in the sink by siphoning the acid solution into the sink and onto a pile of sodium bicarbonate (baking soda). The siphoning tube and the sodium bicarbonate are in

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the cabinets below the acid bath. Run the tap water at the same time to aid in the neutralization process.

3. Fill the acid bath with about 23 liters of MQ water (up to the line).
4. Slowly add 2.5 L of concentrated HCl to the water. Keep the cover over the tub as much as possible during acid addition as HCl will fume. Be extremely careful when handling concentrated acid!
5. Fill to 25 L mark on the bath container.
6. Fill out the acid bath log with the date and your initials. After changing out acid bath, take note of the quantity of full reagent grade HCl bottles. If there are fewer than two full bottles of reagent grade HCl, inform the lab manager so that more can be ordered.